27 GHB METHODOLOGY

27.1 Brief Pharmacology: Central nervous system depressant

27.2 Drug Group Examples:

27.2.1 Gamma hydroxybutyric acid (GHB), gamma-butyrolactone (GBL) and 1,4-butanediol (BD)

27.2.2 Other names for gamma hydroxybutyric acid include gamma hydroxybutyrate; 4-hydroxybutyrate; 4-hydroxybutanoic acid; sodium oxybate; and sodium oxybutyrate.

27.3 Scheduling:

- Schedule I : GHB (not found in an approved drug product)
- Schedule III : Any drug product containing gamma hydroxybutyric acid, including its salts, isomers, and salts of isomers, for which an application is approved under section 505 of the Federal Food, Drug, and Cosmetic Act
- Enhanced penalty: Possession and distribution of gamma-butyrolactone and 1,4-butanediol when intended for human consumption is a Class 3 felony.

27.4 Chemical Properties:

27.4.1 GHB: Pure GHB is a white powder. It is encountered dissolved into various liquids.

27.4.2 GBL: Pure GBL is a clear liquid. It is encountered dissolved into various liquids.

27.4.3 BD: Pure BD is a viscous clear liquid.

27.5 pH:

27.5.1 If the sample is in a liquid form, take the pH of the solution prior to beginning analysis. GHB is generally found in basic solutions while GBL is generally found in acidic solutions. However, equilibrium occurs between the two in solution.

27.6 Color Test Results:

27.6.1 Ferric Chloride – GHB will turn red-brown (Results can vary depending on sample pH and liquid matrix. Therefore, further screening is necessary.)

27.6.2 GHB Color Test #3 (Smith Test) – GHB – immediate green

27.7 TLC:

27.7.1 Bath: TLC3 and TLC10 (Ethyl Acetate) are recommended.

27.7.2 Detection: Iodine Vapors Results (in TLC10)

- GHB off-white spot at origin
- GBL brown spot near solvent front
- BD off-white to brown bearding spot midway up plate

27.8 GC:

27.8.1 GHB will form gamma-butyrolactone (GBL) in the heated injection port. The silyl derivative, prepared prior to injection, is required to differentiate GHB from GBL.

27.8.1.1 If the solution contains a mixture of GBL and GHB, perform multiple chloroform rinses of the solution to remove the GBL prior to derivatization. GHB is not soluble in chloroform.

27.8.1.1.1. This chloroform extract containing GBL can be used for GC retention time comparison with a GBL standard.

27.8.1.2 Monitor the chloroform extracts by GC/MS to see when the majority of the GBL has been removed. After performing the extracts, dry down your sample under an air stream and/or in a vacuum oven without heat. Then, derivatize your sample with BSTFA with 1% TMCS.

27.8.2 BD does not chromatograph well and may breakdown (lose water) in the heated injection port.

27.9 GC/MS:

27.9.1 GHB and BD - Derivatize dry sample with BSTFA with 1% TMCS. See MS file for conditions.

27.9.2 GBL: A chloroform extract of a liquid containing GBL can be used to confirm GBL by GC/MS.

27.10 FTIR:

27.10.1 GHB: Direct KBr pellet on powder sample for GHB.

27.10.2 BD: Light liquid smear on prepared KBr pellet.

27.10.3 GBL: Light liquid smear on prepared KBr pellet. If results are unfavorable, perform a chloroform extract of liquid. Use this extract to prepare either a liquid smear on a prepared KBr pellet or dry it on KBr prior to making a pellet.

27.10.4 GHB/GBL Mixtures:

For liquid mixture samples of GHB and GBL, it may be necessary to separate the GHB from the matrix and/or accompanying GBL using preparatory TLC. Streak the origin of a TLC plate with the liquid sample, run in TLC10, vacuum/scrape off silica gel at origin, and elute GHB from silica gel with multiple rinses of the same methanol extract. Dry down the methanol extract and prepare a KBr pellet of the resultant powder.

27.11 References:

27.11.1 Ciolino, L. A. et al. "The Chemical Interconversion of GHB and GBL" Forensic Issues and Implications" *Journal of Forensic Sciences*, 2001, Vol. 46, No. 6, pp. 1315-1323.

27.11.2 Bommrito, C. "Analytical Profile of Gamma-Hydroxybutyric Acid (GHB)" *Journal of the Clandestine Laboratory Investigating Chemists Association*, Vol. 3, No. 3, 1993.

27.11.3 Chappell, J. S. "The Non-equilibrium Aqueous Solution Chemistry of Gamma-Hydroxybutyric Acid" *Journal of the Clandestine Laboratory Investigating Chemists Association*, Vol. 12, No. 4, 2002.

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